To: Deschambault, Lynda[Deschambault.Lynda@epa.gov]
Cc: Greg Reller (gr@burlesonconsulting.com)[gr@burlesonconsulting.com]
From: Brown, Anthony R (RM)
Sent: Fri 4/7/2017 1:17:36 AM
Subject: Leviathan Mine Aspen Seep Bioreactor Update

Lynda – In response to your request below for an update on today's site visit to the Aspen Bioreactor, I can tell you that our efforts at reducing the standing water level in Pond 4 were successful. As planned, field crews cleared debris from the Pond 4 effluent launder and increased the diameter of the outlet piping from 1-inch to 2-inch pipe, including removal of the 1-inch flow meter. We also pumped down the treated water in Pond 4 for several hours. The result of these efforts is increased effluent flow out of the bioreactor – to better match the influent rate – and a substantially lowered Pond 4 water level. We believe these efforts will be successful in preventing any overflow from Pond 4 and any overtopping of the Pond 4 berm going forward. We do not anticipate any erosion or the need for other contingencies to prevent an overflow at the present time.

Your questions below ask for detailed information about the effect of higher throughput on the performance of the bioreactor. We have increased the sodium hydroxide and ethanol feeds into the bioreactor, which we believe is effectively controlling pH and metals concentrations in the effluent. Sampling from our recent site visit in March, which occurred before further increases to the sodium hydroxide feed rate, suggest that the bioreactor continues to perform adequately and that the effluent is meeting most or all discharge criteria (with the possible exception total iron).

We wanted to get this information to you tonight. We will provide additional technical information in response to your other questions below as soon as it is practicable to do so.

Anthony R Brown

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From: Deschambault, Lynda [mailto:Deschambault.Lynda@epa.gov]
Sent: Thursday, April 06, 2017 4:03 PM
To: Brown, Anthony R (RM)
Cc: Mike Johnson; Greg Reller; Cohen, Adam; Wirtschafter, Joshua; Helmlinger, Andrew; Cory Koger; Chang, Kay SPK; tavassoli, lily; Doug Carey; Black, Ned; Serda, Sophia; Yogi, David
Subject: FW: Leviathan Mine Aspen Seep Bioreactor update

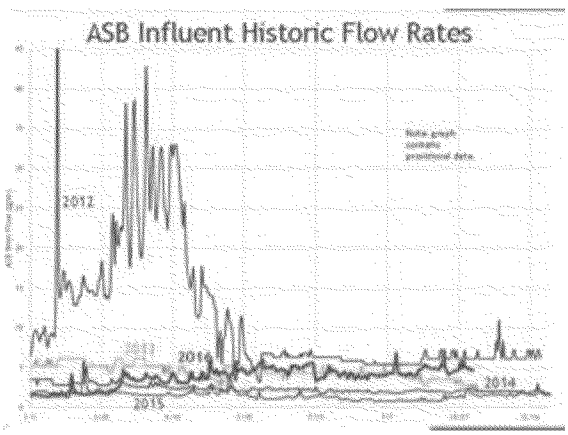
Hello Tony,

Per our exchanged voice mail conversations today--- EPA would appreciate an update on how today's site visit to the Aspen Bioreactor went, and get your quick feedback on the following few questions.

Please get back to me with you responses today if possible. EPA assessing the appropriate response to notify stakeholders of the possibility for release of partially treated water from ASBR

(similar to the notification sent about the Upper Ponds).

1) **Flow Rates**: Could you please provide some additional updates on charts and figures regarding flow, freeboard etc? For instance this one:



2) **Bioreactor Residence time at the higher flows:** Please provide an assessment of the flow rates with respect to residence time, and identify what is necessary for

treatment to occur. If ARC finds that the residence time is becoming too short, please provide a plan to address this and identify any necessary changes. If influent flows become too high--- sufficient treatment may not occur and effluent concentrations could exceed discharge requirements. Please ensure that ARC take discharge samples using rush turnaround time, and present to EPA as soon as available. i.e. within 5 days.

3) **Bacterial Health:** . Please provide us with an assessment of the bacterial health impacts and whether the increased flows are a threat to the short and long term utility of the bioreactor. As you know,t The bioreactor functions by creating an environment (pH, carbon, other nutrients, temperature) conducive to a thriving population of sulfate reducing bacteria. If the increasing influent rate causes significant changes to any of these environmental factors, the bacteria can be disrupted and associated treatment capacity may be reduced reduced. In the extreme, this could result in long term (possibly permanent) damage to the bioreactor and impair its effectiveness. Please let us know what plans are in place to protect the function of the bioreactor.

4) **Potential contingencies:** Please let us know what other contingencies ARC will consider and the pros/cons of each. Contingencies may include increasing the feed rates for NaOH, nutrients, and ethanol; and bypassing part of the influent flow to ASBR Pond 3. However, controlling the chemical feed rates will provide limited control in that the activity of the bacteria does have limits. And Bypassing would result in discharging a blend of ASBR effluent with untreated Aspen Seep water—ie discharge of partially treated water.

5) **Erosion:** Pleae let us know if there is an engineered way of controlling excessive fluid flowing into and out of Pond 4 . If there is the potential for fluid flowing directly over the Pond 4 berm, there would likely be erosion between Pond 4 and the I/O pond. If erosion in that area continued unabated, it is reasonable to assume that some head cutting would occur in the direction of Pond 4 itself. Please assess the severity of head cutting, and whether or not the structural integrity of the ASB Pond 4 could be threatened.

Please get back to me with you responses today if possible.

EPA is assessing the appropriate response to notify stakeholders of the possibility for release of partially treated water from ASBR (similar to the notification sent about the Upper Ponds).

Please also provide an update on the HDS plant and Pond 4. Thanks!

Best Regards,

Lynda Deschambault

Environmental Scientist

USEPA Region 09

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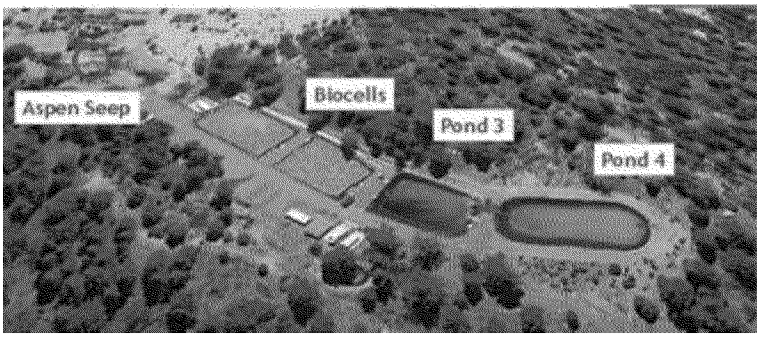

Please be advised I may have limited access to email , therefore please be patient with any communication delays.

From: Mike Johnson [mailto:mike.johnson@copperenv.com]
Sent: Wednesday, April 05, 2017 6:07 PM
To: Deschambault, Lynda <Deschambault.Lynda@epa.gov>
Cc: gr@burlesonconsulting.com; Dave McCarthy <dave.mccarthy@copperenv.com>; Cohen, Adam <Adam.Cohen@dgslaw.com>
Subject: Leviathan Mine Aspen Seep Bioreactor update

Lynda,

We wanted to give a brief update on current events at the Aspen Seep Bioreactor. We have been remotely monitoring the Aspen Seep Bioreactor and have been watching the flows increase steadily. In the last day we have seen a slight increase in the water elevation of Pond 4. This indicates that our influent flow rate is out pacing our effluent flow rate. Since a significant storm is forecasted, we are planning to attempt to access the site tomorrow to address the pond 4 water elevation and effluent flow rate. We still have roughly 75,000 gallons of storage available and our effluent flow rate is averaging 26 gpm. As currently configured, the maximum design flow capacity of the ASB Treatment System is 27 gpm. If we can gain safe access, we will complete the following tasks to protect against a possible exceedance of Pond 4 storage capacity:

- Check for and remove any obstructions to flow at the Pond 4 effluent launder.

- Pump water from near the effluent launder of pond 4 to the aeration channel to lower Pond 4 elevation.

- Increase piping size at outlet from 1 inch piping to 2 inch near the discharge of the aeration channel, including temporary removal of the 1" in-line effluent flowmeter. This will greatly increase overall capacity of the discharge of our system and help us manage future increased expected flow rates. Once we have safe access for four-wheel drive vehicles and supplies all the way to the ASB Treatment System, we will then change the piping back to the 1" PVC and re-connect the 1" flowmeter, or permanently switch to 2"PVC and a 2" flowmeter. Although we will not be able to directly monitor the effluent flow rate while the flow meter is disconnected, we will still be monitoring the influent flow rate, so we will still have a good indication of total flow through the ASB Treatment System. These plumbing modifications will not otherwise affect our ability to control the system components.

We don't anticipate these changes to negatively impact water quality of our discharge since Pond 4 is a final settling pond. Our site access may require some snowshoeing, so we are postponing compliance samples until we complete road work scheduled next week. Taking the compliance samples at that time should still give a representative sample.

Thanks,

Mike Johnson, PE

Senior Engineer

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